An alteration of the zero point of ± half an hour, equal to about 50 miles, does not produce any remarkable improvement; and I doubt greatly whether, from a scientific point of view, any reasonable accordance between calculation and observation could in any way be made out.

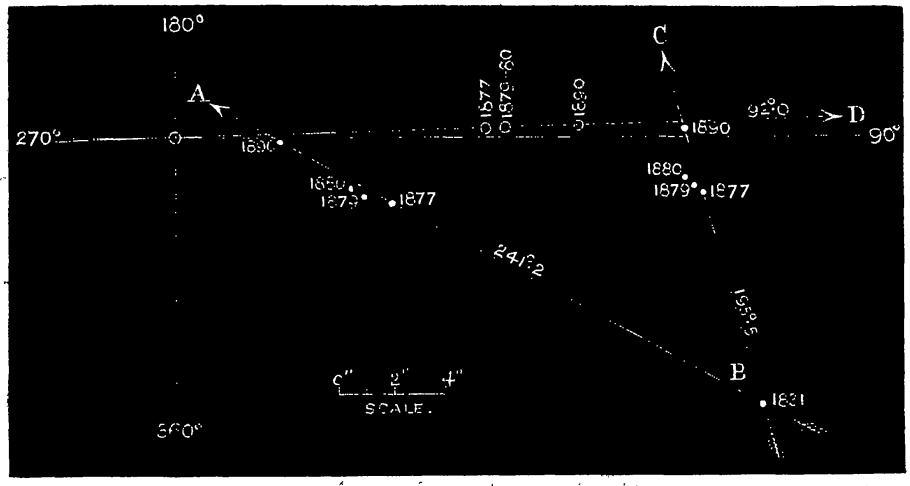
The Proper Motion of H 1968. By S. W. Burnham.

The double star *H* 1968 was first noted by Sir John Herschel with the 20-foot reflector at Slough, and entered in his Fifth Catalogue, published in 1833 (*Memoirs R.A.S.*, vol. vi.) The position-angle was measured and given as 61°·3, the distance being estimated as 20″±, and the magnitudes called 8 and 10–11. Naturally a pair of this class would not attract much attention, and, so far as I know, it was never looked at or referred to by anyone for nearly half a century following. During the several years in which I was using the 6-inch Clark telescope at Chicago, I looked up hundreds of double stars to fix their places by identifying them in some of the star catalogues, to correct various apparent errors in magnitudes, descriptions, &c., and for other purposes, and among others examined the pair in question in December 1875. The apparent change since Herschel's observation, particularly in distance, was very striking, and could not come from any ordinary error in the early description. I called the attention of Baron Dembowski to the probable change which had taken place, and he made a set of measures in 1876 and 1877, which will be found on page 347 of vol. i. of his observations. The name of the star is not given. Subsequently this pair was measured at Cincinnati, and still later by me with the 18½-inch refractor of the Dearborn Observatory. I have lately finished a series of measures at this observatory. So far as I know, these are all the measures that have been made anywhere. They are as follows :—

1831	61°·3	20″±	8	10–11	H	1*n*
1877·23	73·1	8·50	7·1	10·0	De	4*n*
1879·87	71·9	7·46	...	...	Cin	2*n*
1880·09	73·6	6·94	...	...	β	3*n*
1890·86	87·8	3·98	7·5	9 7	β	4*n*

These measures should be sufficient to determine the character of the motion. We have no means of ascertaining the exact time when Herschel measured the angle; but as he states the observations of the stars comprised in his Fifth Catalogue were made in the years 1830 and 1831, I have assumed 1831·0 as the most probable date, and that is near enough for the purposes of this investigation.

This star, according to Argelander, has a proper motion of 0″·356 in the direction of 92°·6; but it has been shown recently (Stumpe, Ast. Nach., No. 2999) that from an error in R.A. in one of the catalogues, this value is too large, and that the annual movement is 0″·252 in the position-angle of 92° 0. Laying down the measures given above, it is apparent that this proper motion entirely fails to account for the motion of the small star, which makes a large angle with the line of the motion of the principal component.



The accompanying diagram shows the several positions of the stars at the dates given. The original diagram was made on a scale of 2″ to one inch, and then photographed down to the size given here. The position-angles were accurately plotted to the tenth of a degree, and the distances to the second decimal place. The positions on the line A B are those of the small star, with the principal star considered fixed at the central point. If the smaller star were really fixed, then of course this line should be parallel with the line D, which is the direction of the proper motion of the other star. One of two things must certainly follow: either this proper motion is erroneous, or the smaller star has a proper motion of its own, for it is evident that no question of orbital motion can arise in this case. The apparent motion of B during the interval of 13·63 years between the measures of 1877 and 1890 is 4″·75, or at the rate of 0″·35 per annum, in the direction of 241°·2. Evidently, if this star is fixed, the proper motion of A given above is wrong, and should be 0″·35, in the direction of 61°·2. This would give some change in declination, instead of placing it substantially all in right ascension. It does not seem probable that so large an error exists in the recognised proper motion.

On the other hand, if the motion of A is sensibly correct, the real motion of B can be easily determined from the positions of that star on the line B C, which are plotted with reference to the

successive places of A along the line D at the several epochs, determined by the annual proper motion of 0″·252. In other words, these places are the actual positions in the heavens of the two stars at the several dates upon the assumption that the larger star has a yearly movement of 0″·252, in the direction of 92°·0. In that case B has an annual motion of 0″·18, in the direction of 195°·5. Both of the lines A and C are drawn through the positions given by the measures of 1877 and 1890, as they are made up of more individual observations, and will, I think, give a more reliable direction than could be derived from all the measures. In the inferences drawn from these measures no use is made of the approximate measures of Herschel, but we can see what the position-angle and distance should have been in 1831 by both assumptions of proper motion. At that time B must have been 24″ distant, in the direction of 65°·5, which is as close an agreement with Herschel's observation as could be expected. The minimum distance between the stars of 1″·8 will be reached about 1901, after which they will slowly separate.

The principal star is *Lalande* 593, and its place (1880) is :—

R. A. $0^h\ 21^m\ 35^s$
Decl. — $17°\ 4'$

The magnitude is variously estimated. In addition to the magnitude given in connection with the measures, it is rated as 8 by Lalande and Gould, and 7·3 by Schönfeld.

Mount Hamilton.
1890 *Dec.* 5.

A Comparison between the Greenwich Lunar Observations, 1887, *and Hansen's Tables uncorrected and corrected for the Change in the Unit of Mean Time introduced in the Year* 1864, *and with Hansen's Tables as modified by Professor Newcomb.* By E. J. Stone, M.A., F.R.S., Radcliffe Observer.

The Appendix to the *Monthly Notices*, vol. l., contains the results of an accurate comparison between the Greenwich Lunar Observations 1847–1861 and Hansen's Tables.

An examination of the residual errors H–O will show that the motion of the Moon was very closely represented by Hansen's Tables during the period 1847–1861. But the separate residuals indicate the existence of sensible, if small, errors in Hansen's Tables due either to defects of theory, or to imperfections in the practical methods of comparing the theoretical and observational results.

The largest residual errors H–O in longitude which I have noticed amongst the results from the meridional observations are :—